

Advanced Supported Liquid Membranes for CO₂ Control in EVA Applications, Phase II

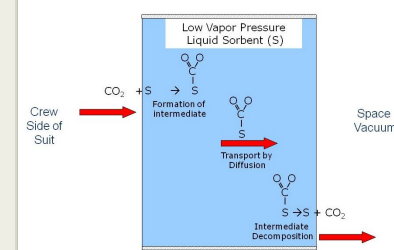
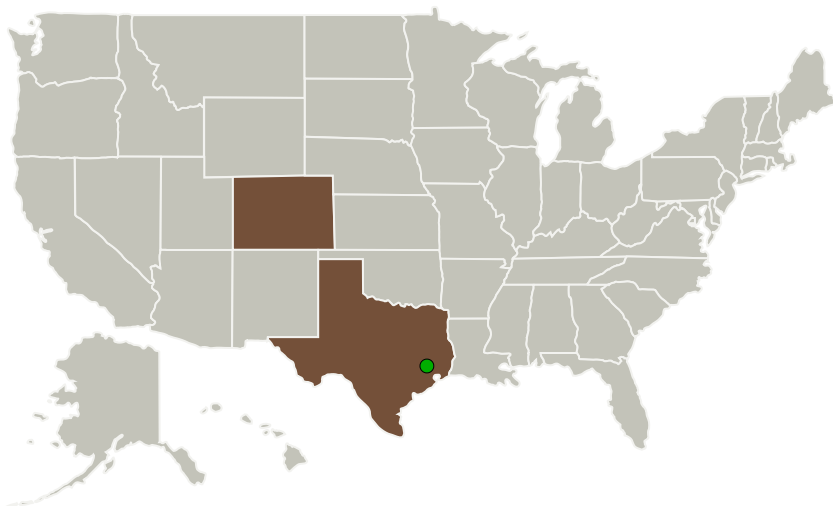
Completed Technology Project (2012 - 2015)



Project Introduction

The development of new, robust, lightweight systems for CO₂ removal during EVA is a crucial need for NASA. Current activity is focused on extending mission times without increasing the size and weight of the portable life support system (PLSS). Although CO₂ sorbents that can be regenerated during EVA are being studied, these systems add "on back" hardware, increasing weight and complexity, and reducing reliability. A simpler approach is to use a membrane system to separate CO₂ and H₂O from the O₂ environment, however separating CO₂ from O₂ is difficult with standard membranes. However, developing a low pressure liquid sorbent that reversibly absorbs CO₂, could facilitate the needed separation. In the Phase I project, Reaction Systems synthesized new CO₂ low vapor pressure sorbents that had good reversible CO₂ absorption capacity and demonstrated high selectivity for CO₂ over O₂ in a supported liquid membrane tests. Therefore we demonstrated the feasibility of employing a supported liquid membrane to control CO₂ in EVA. In Phase II we will improve the performance by increasing the sorbent loading, reducing its viscosity, and optimizing the membrane support. We will then design and construct a prototype, that is sized to control the metabolic CO₂ generation of a single crew member.

Primary U.S. Work Locations and Key Partners



Advanced Supported Liquid Membranes for CO₂ Control in EVA Applications Project Image

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Organizations Performing Work	Role	Type	Location
Reaction Systems, LLC	Lead Organization	Industry	Golden, Colorado
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Colorado	Texas

Project Transitions

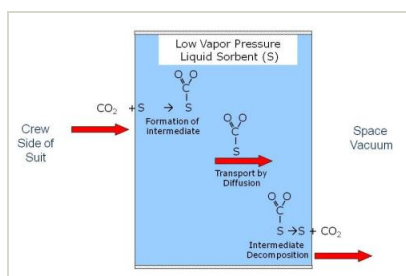
▶ **April 2012:** Project Start

✓ **April 2015:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137380>)

Images



Project Image

Advanced Supported Liquid Membranes for CO₂ Control in EVA Applications Project Image (<https://techport.nasa.gov/image/133460>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Reaction Systems, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

David Wickham

Co-Investigator:

David Wickham

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Technology Maturity (TRL)

Start: 4
Current: 6
Estimated End: 6



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.2 Extravehicular Activity Systems
 - └ TX06.2.2 Portable Life Support System

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System